

## CHAPTER 1

## GENERAL

**1-1. Purpose**

This manual provides guidance for all Army, Navy, and Air Force installation personnel engaged in the maintenance and repair of surfaced areas and related structures. It is intended to be practical and concise and useful to foremen as well as engineers.

**1-2. Scope.**

This manual provides guidance for effective maintenance and repair of roads, streets, parking and open-storage areas, walks, airfields, and similar traffic areas at Army, Navy, and Air Force installations. Methods used in accomplishing maintenance and repair work are described. Navy policy in these areas is given in OPNAVINST 11010, 20E. The materials, methods, and equipment cited in this manual represent the most predominate types used in the construction industry. Locally available materials, methods, or equipment not cited in this manual can be used when experience warrants. The text includes general principles of maintenance and repair for use by all activities designated to maintain pavements in a condition suitable for their intended use. The servicing functions of sweeping, snow removal, and ice control described in this manual are applicable to the Army and Navy activities only.

**1-3. References**

Appendix A contains a list of references used in this document.

**1-4. General principles for maintenance of surface areas**

Pavements are usually classified as flexible (bituminous concrete surface) or rigid (portland cement concrete surface). Natural soils are not usually suitable for heavy vehicular traffic or any great volume of vehicular or pedestrian traffic. The simplest types of surfaced areas are those in which coarse materials are added to fine-grained soils, fine soil binders are added to coarse-grained soils, or a waterproofing agent is applied to the surface of naturally stable soils. Heavy loads require surfaced areas that are strong and thick enough so that the transmitted load does not exceed the load-bearing capacity of the subgrade soil. Figure 1-1 shows the general principle of transmission of wheel loads to the subgrade. Unit pressures transmitted to the surface are approximately equal to the tire pressure. Greater surfaced area thickness is required over subgrades having lower bearing capacity than

over subgrades having higher bearing capacity. Figure 1-2 shows typical cross sections of surfaced areas.

*a. Surface areas.* Surface areas includes all pavements and miscellaneous or stabilized (other than grass) areas used for vehicular, aircraft, or pedestrian traffic (such as roads, streets, service drives, walks, parking areas, open storage, and airfield paved areas).

*b. Standards of maintenance and repair.* The basic objectives of the standards outlined in this manual are to maintain surfaced areas in an economical manner that will protect the Government's investment, reduce to a minimum the hazards to life and property, and permit continuous use. The concept of standards of maintenance and repair will vary depending on whether the repairs are of an emergency nature with a short life expectancy, semipermanent, or permanent. The quality of the materials used and the thoroughness of the repair will depend on the nature of the repair. Prompt and adequate maintenance is of paramount importance. The general maintenance principles below shall be observed.

(1) *Prompt maintenance.* Once deterioration or destruction of a surface has started, it can proceed very rapidly. A minor maintenance job postponed can thus develop into a major job involving base, subbase, and subgrade as well as surface. Therefore, timely and adequate inspection and maintenance are essential.

(2) *Priority.* Priority in making repairs depends on operational requirements, traffic intensity, and consideration of the hazards that would result from complete failure.

(3) *Traffic interference.* Maintenance and repair work shall be scheduled to minimize interference with essential traffic. Whenever feasible, the work shall be planned and performed to permit at least partial or limited use of the facility. When it is necessary to completely close a facility, plans shall be made for alternate operational areas, and the work shall be done in the least possible time. When a facility is to be partially or completely closed, every effort will be made to publicize the closure several days in advance. Media that can be used include base newspapers, daily bulletins, and base radio stations.

(4) *Basic causes.* Surface repair without correction of a faulty subgrade, subbase, or base only temporarily corrects a poor condition, necessitating further maintenance and repair at a later date.

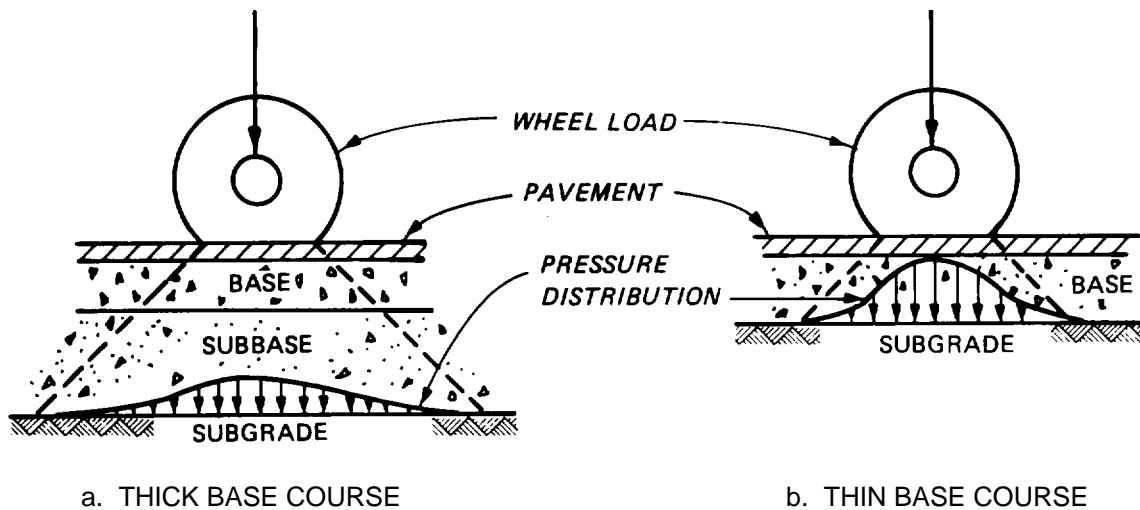


Figure 1-1. Transmission of wheel loading to subgrade.

Explorations to determine the cause of failure and action to eliminate the cause as well as to repair apparent damage are considered basic requirements.

(5) *Uniformity.* Maintenance and repair of existing surfaces will conform as closely as possible to the original construction in design, material, strength, appearance, and texture. A uniform pavement is easier to maintain.

(6) *Overloads.* Surface areas subjected to extensive overloading eventually require reconstruction and/or strengthening. Repairs to such areas will involve only minimum work necessary to keep them in operating condition until overall corrective measures are taken.

(7) *Usage.* The extent of maintenance, repair, and rehabilitation of surfaced areas will be governed by the anticipated use. Routine maintenance will be based on a continuing long-term planned program at each activity. On land that is held under lease, permit, or easement, the terms of such document will be taken into consideration when the extent and type of maintenance, repair, and rehabilitation are determined.

c. *Selection and sampling of materials.* Proper planning and selection of materials as well as methods of operation will determine to a large extent the efficiency of the methods of pavement maintenance.

(1) *Inspection and sampling.* Field inspections and tests are generally adequate for the selection of soils and aggregates, control of gradation, and the proportioning of bulk materials during the progress of the work. The inspections also serve as a basis for accepting or rejecting processed or manufactured materials. Laboratory tests are needed to determine the physical and chemical properties of materials. These tests may be performed by laboratories of the

Air Force, Naval Districts Public Works Offices, Corps of Engineers Division and District offices, State highway department, or by commercial firms especially equipped for this purpose.

(2) *Material survey.* Surveys will be made to determine the location, nature, and cost of all natural and processed materials available locally and/or from nearby commercial sources. Complete information about these materials will be obtained and kept on file for future use. Frequently, maintenance and repair work may be accomplished with local materials either in their natural state or screened, crushed, or blended. The use of these local materials results in savings in man- and equipment-hours, transportation, and money.

d. *Surfaced area inspection.* A comprehensive maintenance program will be developed and aggressively executed in order to lengthen pavement life and reduce maintenance and repair problems and costs. Frequent pavement inspections can detect early evidence of defects before actual failure occurs. Frequent inspections should be semiannually or annually depending on the type of surfaces and local climatic or operational conditions. Seasonal inspections of drainage systems will be made. At least twice a year, subsurface drains will be examined to make sure that they are working properly. Drainage inspections should be made during rainy seasons, spring thaws, and immediately following heavy storms. Most potential failures such as cracking, undermining, poor drainage, pumping of slabs, and progress of weathering action may be found through detailed inspections, examination, and testing. Inspection should be conducted by competent personnel to ensure that deficiencies are properly identified and reported.

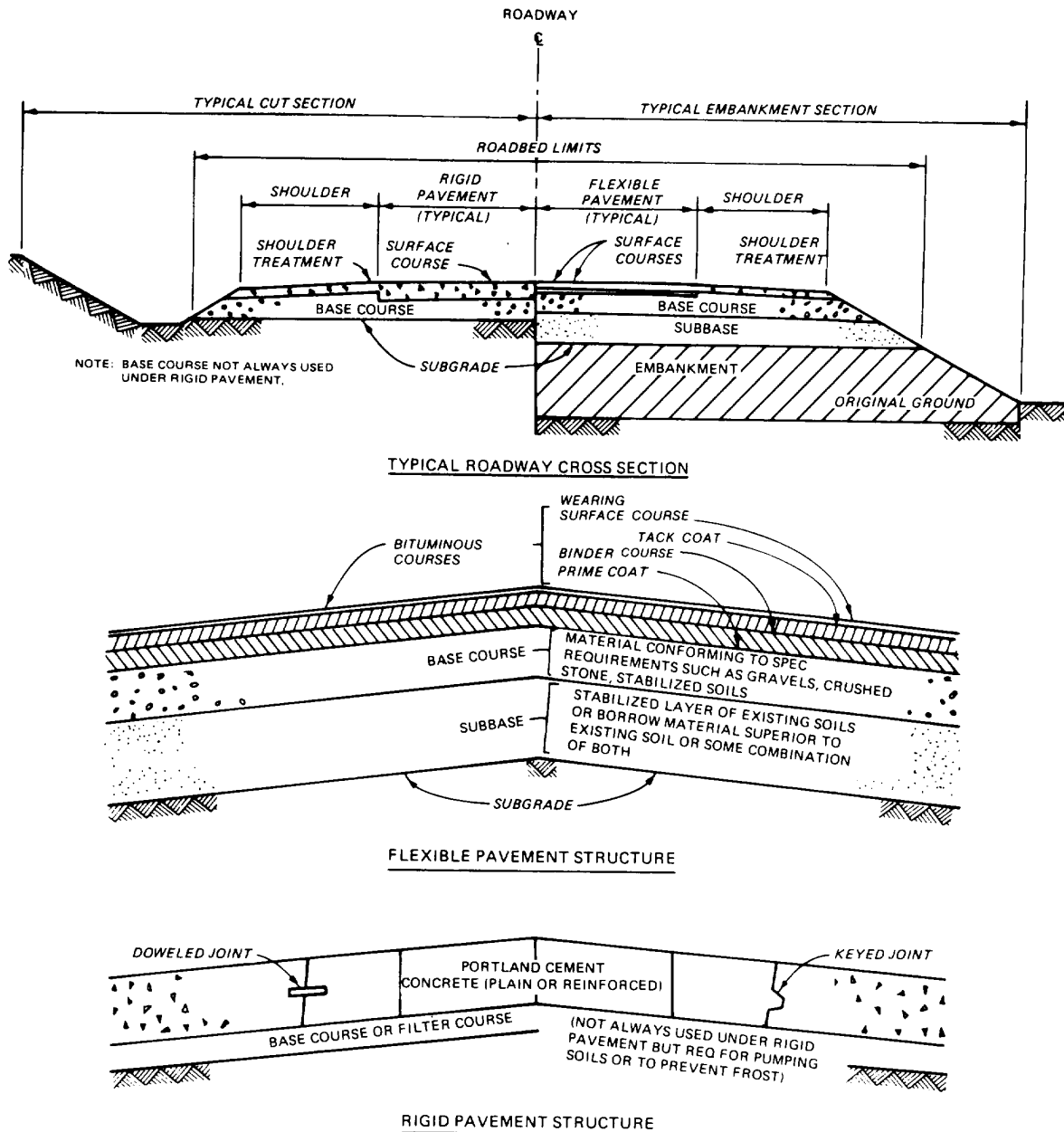


Figure 1-2. Typical cross-sections of surfaced areas.

e. **Overlay.** In areas where surface drainage can be maintained, the use of overlays is often economical and advantageous. An overlay is used to increase the strength of the pavement structure and to improve the quality of the surface.

f. **Reconstruct and/or recycle.** Reconstruction and/or recycling should be considered when the pavement has deteriorated to a condition where normal repair procedures are no longer feasible. Recycling of pavements as either base or surface

materials can be economical when compared to reconstruction with virgin material. The various methods and types of recycling should be considered to determine the most cost effective alternative for a particular pavement.

#### 1-5. Safety

Personal protective clothing will be issued at the option of the Base or Post Civil Engineer to ensure the health and safety of Civil Engineering personnel.

Protective clothing includes, but is not limited to, coveralls, goggles, respirators, protective headgear, and steel-toed shoes that may be required in performing the work addressed in this manual.

*a. Equipment.* Selected equipment will be used when personnel are engaged in handling or placing hot tar, hot asphalt, acids, caustics, creosoted materials, and other liquids that are hazardous. Selected equipment will also be used in sledging, hammering, or chipping on concrete, stone, or metal; and in

handling heavy and sharp-edged or abrasive materials. Reflective vests should be available for all personnel when working in traffic areas.

*b. Signs and markings.* Safety signs and markings, such as traffic guides, road and runway markings, safe load limits of bridges and culverts, and maximum clearances of overhead structures will be kept clear and legible. Control devices will be operated to the extent necessitated by the traffic involved.